PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P102599WO	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/GB2004/004072	International filing date *(day/month/year)* 24.09.2004	Priority date *(day/month/year)* 26.09.2003
International Patent Classification (IPC) or national classification and IPC H04L12/40		
Applicant HAWKE CABLE GLANDS LIMITED		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☒ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13.07.2005	24.02.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer DE LA PENA ALVAREZ Telephone No. +49 89 2399-

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/004072

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1, 2, 5-11	as originally filed
3, 3a, 4	received on 13.07.2005 with letter of 08.07.2005

Claims, Numbers

1-12	received on 13.07.2005 with letter of 08.07.2005

Drawings, Sheets

1/2, 2/2	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☒ the description, pages 3
   - ☒ the claims, Nos. 1
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3,4,8,9,11
	No:	Claims	1,2,5-7,10,12,13
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-13
Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item I.

1 The amendments filed with the demand introduce subject-matter which extends beyond the content of the application as filed (Art. 34(2)(b) PCT).

1.1 According to claim 1 the circuit is adapted to detect a voltage change across the sensing resistor. This is not disclosed in the original application, which discloses a circuit adapted to detect if the current is greater or lower than a second or a first threshold, respectively.

Re Item V.

The following documents are referred to in this communication:

D1: US 6 151 649 A (DINH HUNG ET AL) 21 November 2000

D2: US-A-5 920 266 (DIXON GLENN B ET AL) 6 July 1999

1 The subject-matter of claim 1 is not new in the sense of Art. 33(2) PCT.

1.1 Document D1, discloses (the references in parentheses applying to this document), in terms of claim 1, an electronic circuit, capable of terminating a plurality of conductors at, or near, a node on a network (col. 6, line 1, to col. 7, line 23; fig. 4), comprising:

- detecting means, operable to detect current in at least one of the plurality of conductors (col. 6, line 1, to col. 7, line 23; fig. 4), and
- switching means operable to switch the circuit between being a continuing circuit, upon the detecting means detecting current greater than a first predetermined threshold, and being a terminating circuit, upon the detecting means detecting current at, or less than, a second predetermined threshold (col. 7, lines 1-5),

wherein the detecting means comprises:

- a sensing resistor, connected in series with the at least one of the plurality of conductors (col. 8, lines 19-27; fig. 6), and
- means for detecting voltage across the sensing resistor (col. 8, lines 19-27; fig.

6).

Since all features of claim 1 are known in combination from D1, the subject-matter of claim 1 is not new.

1.2 The above reasoning about the lack of novelty of the subject-matter of claim 1 can also be based on D2 (col. 3, line 33, to col. 5, line 26).

2 The additional features of the dependent claims are either known from D1 (means for detecting voltage being a differential amplifier, switching means comprising a transistor, power supplies operable to provide current flowing in opposing directions) or common measures (impedance matching means comprising a terminating resistor in series with a terminating capacitor, first threshold being the same as second threshold, connections of the transistor).

Re Item VII.

1 The features of the claims are not provided with reference signs placed in parentheses (R. 6.2(b) PCT).

2 Contrary to the requirements of R. 5.1(a)(ii) PCT, the relevant background art disclosed in D1 is not mentioned in the description, nor is this document identified therein.

Re Item VIII.

1 Claim 4 is not clear (Art. 6 PCT) because it mentions a single threshold, which is in contradiction with claim 1, on which claim 4 depends. Claim 1 mentions two thresholds.

A further object of the present invention is to provide a node comprising such an electronic circuit.

A further object of the present invention is to provide a network comprising a plurality of such circuits.

The present invention provides for an electronic circuit, capable of terminating a plurality of conductors at, or near, a node on a network, comprising detecting means, operable to detect current in at least one of the plurality of conductors, and switching means operable to switch the circuit between being a continuing circuit, upon the detecting means detecting current greater than a first predetermined threshold, and being a terminating circuit, upon the detecting means detecting current at, or less than, a second predetermined threshold, characterised in that the detecting means comprises a sensing resistor, connected in series with the at least one of the plurality of conductors, and means for detecting voltage across the sensing resistor, such that a change in current flowing in the at least one of the plurality of conductors, indicative of a break or fault in a said network, is detected by sensing a change in voltage across the sensing resistor.

The terminating circuit advantageously comprises impedance matching means. The impedance matching means may comprise a terminating resistor connected in series with a terminating capacitor.

The terminating circuit is preferably connected between the at least one of the plurality of conductors and the, or each, of the other conductors.

The network may be an active network and the node may be the end node of that active network.

The first threshold may be greater than the second threshold. The means for detecting voltage is preferably a differential amplifier.

The switching means preferably comprises a transistor wherein the base terminal thereof is connected to an output of the detecting means. The collector terminal of the transistor is preferably connected to the impedance matching means and the emitter terminal is preferably connected to the, or each, of the other conductors.

The present invention also provides for a network node comprising an electronic circuit as herein defined in the preceding six paragraphs.

The present invention also provides a network comprising at least one electronic circuit as herein defined in the preceding six paragraphs.

The present invention will now be described by way of example, with reference to the following drawings, in which:

CLAIMS:

1. An electronic circuit, capable of terminating a plurality of conductors at, or near, a node on a network, comprising detecting means, operable to detect current in at least one of the plurality of conductors, and switching means operable to switch the circuit between being a continuing circuit, upon the detecting means detecting current greater than a first predetermined threshold, and being a terminating circuit, upon the detecting means detecting current at, or less than, a second predetermined threshold, characterised in that the detecting means comprises a sensing resistor, connected in series with the at least one of the plurality of conductors, and means for detecting voltage across the sensing resistor, such that a change in current flowing in the at least one of the plurality of conductors, indicative of a break or fault in a said network, is detected by sensing a change in voltage across the sensing resistor.

2. An electronic circuit as claimed in Claim 1, wherein the terminating circuit comprises impedance matching means.

3. An electronic circuit as claimed in Claim 2, wherein the impedance matching means comprises a terminating resistor connected in series with a terminating capacitor.

4. An electronic circuit as claimed in any of the preceding claims wherein the first threshold is the same as the second threshold.

5. An electronic circuit as claimed in any of the preceding claims, wherein the means for detecting voltage is a differential amplifier.

6. An electronic circuit as claimed in any of the preceding claims wherein the switching means comprises a transistor.

7. An electronic circuit as claimed in Claim 6, wherein the transistor comprises a base terminal connected to an output of the detecting means.

8. An electronic circuit as claimed in Claims 6 or 7, wherein the transistor comprises a collector terminal, connected to the impedance matching means, and an emitter terminal connected to the, or each, of the other conductors.

9. A node comprising an electronic circuit as claimed in any of the preceding claims.

10. A node as claimed in Claim 9, further comprising checking means operable, upon the detecting means detecting current at, or less than, the second predetermined threshold, to check the status of the conductors connected to an adjacent node.

11. A network comprising at least one electronic circuit as claimed in any of the preceding claims.

12. A network as claimed in Claim 11, comprising a plurality of power supplies operable to provide current flowing in opposing directions through the network.